IN THE CLAIMS:

1. (Canceled) An motion control system for use with a lithography system, said motion control system comprising:

a wafer stage base;

at least two actuators for controlling motion;

at least two sensors for detecting at least one parameter of displacement of said wafer base and producing at least two signals in response thereto; and

at least one circuit in electrical communication with said actuators and said sensors;

wherein, upon the detection of said at least one parameter of displacement by said sensors, said sensors signal said circuit, which, in response, activates said actuators to stabilize the wafer stage base.

2. (Canceled) The motion control system of claim 1, said actuators are selected from the group consisting of a voice coil motor and electroactive stack actuator.

3. (Canceled) The motion control system of claim 1, said sensors selected from the group consisting of LVDT, accelerometer, laser interferometer, capacitive displacement sensor.

4. (Canceled) The motion control system of claim 1, said circuit comprising a digital signal processor.

5. (Canceled) The motion control system of claim 1, said circuit comprising:

at least one digital signal processor,

at least one analog to digital converter, and

at least one digital to analog converter.

6. (Canceled) The motion control system of claim 1, said circuit comprising a control technique.

7. (Canceled) The control technique of claim 6, said control technique selected from the group of linear quadratic gaussian, H-infinity, and mu-synthesis.

8. (Canceled) The motion control system of claim 1, wherein said actuators stabilize said wafer stage base to closely follow a commanded input.

9. (Canceled) An motion control system for use with a lithography system, said motion control system comprising:

a wafer stage;

at least two actuators for controlling motion;

at least two sensors for detecting at least one parameter of displacement of said wafer base and producing at least two signals in response thereto;

a signal conditioner; and

a single board computer

wherein, upon the detection of said at least one parameter of displacement by said sensors, said sensors feed a signal to said signal conditioner, said signal conditioner feeds a signal to said single board computer, and said single board computer commands said actuators to command said wafer stage to track a commanded position.

10. (Canceled) The motion control system of claim 9, wherein said actuators are selected from the group consisting of voice coil motor and electroactive stack actuator.

11. (Canceled) The motion control system of claim 9, wherein said sensors are selected from the group consisting of LVDT, accelerometer, laser interferometer, capacitive displacement sensor.

12. (Canceled)The motion control system of claim 9, wherein said wafer stage is commanded to track a commanded position within 0.19 seconds.

13. (Canceled) A motion control system of Claim 1, wherein said circuit comprises a processor programmed with a control algorithm derived from a mode based state-space model.

14. (Canceled) A system as in Claim 13, wherein said state-space model is derived using a finite element model with fictitious masses.

15. (Canceled) A system as in Claim 13, wherein said processor is an element of a linear quadratic Gausian controller.

16.(New)A method of motion control comprising:

applying induced strain to an elastic portion of an operating machine utilizing at least one induced strain actuator, controlled by a computer processor programmed based upon a state space model;

wherein the state-space model is generated from a dynamic analysis of a simulation of the motion of the elastic portion of the operating machine occurring during the operation of the operating machine.

17.(New) The method of claim 16 further comprising:

the dynamic analysis includes utilization of state-space equations of motion to facilitate the integration of control systems and response simulation employing a synthesis tool.

18.(New) The method of claim 16 further comprising:

wherein the state-pace model is a reduced-order state-space model based upon a selected subset of elements from a Finite Element Model ("FEM") including natural vibration modes within a selected excitation frequency range and selected modes for modal analysis.

19.(New) The method of claim 17 further comprising:

wherein the state-pace model is a reduced-order state-space model based upon a selected subset of elements from a Finite Element Model ("FEM") including natural vibration modes within a selected excitation frequency range and selected modes for modal analysis.

20.(New) The method of claim 16 further comprising:

the dynamic analysis includes utilization f state-space equations of motion to facilitate the integration of control systems and response simulation employing a synthesis tool.

21.(New) The method of claim 17 further comprising:

the dynamic analysis includes utilization f state-space equations of motion to facilitate the integration of control systems and response simulation employing a synthesis tool.

22.(New) The method of claim 18 further comprising:

the dynamic analysis includes utilization f state-space equations of motion to facilitate the integration of control systems and response simulation employing a synthesis tool.

23.(New) The method of claim 19 further comprising:

the dynamic analysis includes utilization f state-space equations of motion to facilitate the integration of control systems and response simulation employing a synthesis tool.

24.(New) The method of claim 20, further comprising:

employing fictitious masses and complementary static load analysis to improve the model's accuracy and/or efficiency.

25.(New) The method of claim 21, further comprising:

employing fictitious masses and complementary static load analysis to improve the model's accuracy and/or efficiency.

26.(New) The method of claim 22, further comprising:

employing fictitious masses and complementary static load analysis to improve the model's accuracy and/or efficiency.

27.(New) The method of claim 23, further comprising:

employing fictitious masses and complementary static load analysis to improve the model's accuracy and/or efficiency.

28.(New) The method of claim 16, further comprising:

utilizing at least one electroactive actuator and high accuracy representation of the structure surrounding the actuator derived utilizing fictitious masses.

29.(New) The method of claim 28 further comprising:

utilizing fictitious mass modal coupling to include the effects of local deformation around selected grid points on the elastic portion.

30.(New) The method of claim 29, further comprising:

utilizing sets of low-frequency modes generated by a standard mode analysis procedure.

31.(New) The method of claim 30, further comprising utilizing a fictitious mass matrix in a finite element model.

32.(New) The method of claim 31, further comprising:

generating cleaned eigenvalues from FEM modes by removing the effects of the fictitious masses, and utilizing the eigenvalues when local response near the fictitious mass point if of interest.

33.(New) The method of claim 16, further comprising:

utilizing electroactive elastic strain actuators to provide elastic vibration damping.